PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN THE APPLICATION OF
RICHARD E. FERNANDEZ
SERIAL NO.: 07/436,465
FILED: 14 NOVEMBER 1989
FOR: FIRE EXTINGUISHING COMPOSITION AND PROCESS

CASE NO.: CH-1762
ART UNIT: 2203
EXAMINER: J. ANTHONY

WILMINGTON, DELAWARE
DATE: 3 MARCH 1992

OK TO ENTER J.D.A.

DECLARATION UNDER 37 CFR 1.132

Honorable Commissioner of Patents and Trademarks
Washington, DC 20231

Sir:

Richard E. Fernandez, a citizen of the United States of America residing at Bear, Delaware, declares as follows:

1. I am the inventor of U.S. Application Serial No. 07/436,465 filed November 14, 1989 which claims a fire-extinguishing composition consisting essentially of at least one fluoro-substituted ethane selected from the group of CF_3-CHF_2, CHF_2-CHF_2 and CF_3-CH_2F, said composition being devoid of any bromine-containing halocarbon and having an ozone depletion potential of less than 0.025.

2. I am aware of the Examiner's rejection on the basis that "Green (U.S. Patent No. 4,954,271) teaches non-toxic fire extinguishing compositions consisting essentially of: 1) a higher boiling fluorocarbon, such as 1,1-dichloro-2,2,2-trifluoroethane (50 to 98%), 2) a lower boiling fluorocarbon such as pentafluoroethane, 1,2,2,2-tetrafluoroethane and 1-chloro-1,2,2,2-tetrafluoroethane (0 to 48%) and 3) a detoxifying agent (2 to 10%)"; and "Applicant's Claim 13 is deemed to be open to Green's chlorofluoroethane fire extinguishing agents which are required by Green";

3. At my instruction, experiments were performed to compare the fire extinguishing performance obtained when :

(a) the fire extinguishing composition contained 100 weight percent pentafluoroethane (CF_3-CHF_2);

pentafluoroethane (CF_3-CHF_2) and 25 weight percent trifluoromethane (CHF_3);

(c) the fire extinguishing composition contained 45 weight percent pentafluoroethane (CF_3-CHF_2), 30 weight percent trifluoromethane (CHF_3) and 25 weight percent chlorodifluoromethane ($CHClF_2$); and

(d) the fire extinguishing composition contained 100 weight percent chlorodifluoromethane ($CHClF_2$).

EXPERIMENTS

The fire extinguishing concentration of each of the compositions was determined by the ICI Cup Burner method. This method is described in "Measurement of Flame-Extinguishing Concentrations", R. Hirst and K. Booth, Fire Technology, Vol. 134(4): 296-315 (1977).

Specifically, an air stream was passed at 40 liters/minute through an outer chimney (8.5 cm I. D. by 53 cm tall) from a glass bead distributor at its base. A fuel cup burner (3.1 cm O. D. and 2.15 cm I. D.) was positioned within the chimney at 30.5 cm below the top edge of the chimney. The fire extinguishing composition was added to the air stream prior to its entry into the glass bead distributor while the air flow rate was maintained at 40 liters/minute. The air and agent flow rates were measured using calibrated rotameters.

Each test was conducted by adjusting the fuel level in the reservoir to bring the liquid fuel level in the cup burner just even with the ground glass lip on the burner cup. With the air flow rate maintained at 40 liters/minute, the fuel in the cup burner was ignited. The first extinguishing agent was added in measured increments until the flame was extinguished. The fire extinguishing concentration was determined from the following equation:

$$\text{Extinguishing concentration} = \frac{F_1}{F_1 + F_2} \times 100$$

where F_1 = Agent flow rate

F_2 = Air flow rate

Two different fuels were used, heptane and methanol; and the average of several values of agent flow rate at extinguishment was used for the following table.

Table

Extinguishing Concentrations

Agent	Fuel		Flow Rate
	Heptane	Methanol	
	Extinguishing Conc.		
Experiment	(vol. %)	(vol. %)	Air (l/min)
(a)	10.1	13.0	40.1
(b)	10.8	17.1	40.1
(c)	10.9	16.9	40.1
(d)	13.6	22.5	40.1

4. In the foregoing experiments, I found that by using pentafluoroethane or a major amount of pentafluoroethane, i.e. an all-hydrofluorocarbon composition having zero ozone depletion potential, I obtained equivalent fire extinguishing performance to a blend containing 25 weight percent of a chlorofluorocarbon, the remainder being all hydrofluorocarbon i.e. 45 percent pentafluoroethane and 30 percent trifluoromethane, and better performance when compared to using 100 weight percent of the chlorofluorocarbon;

5. From the foregoing findings, I conclude that the Green Patent, which requires a composition of at least 50 weight percent of a chlorofluorocarbon along with a minor amount of a hydrofluorocarbon (pentafluoroethane or tetrafluoroethane) for a non-toxic fire extinguishant, but having a substantial ozone depletion potential, would not have suggested to one skilled in the art that a composition having a major amount of a hydrofluorocarbon (pentafluoroethane or tetrafluoroethane) and having a relatively low or zero ozone depletion potential, would display an equivalent fire extinguishing performance.

6. Although the chlorofluorocarbon used in the experiments was $CHClF_2$ and the structurally closest of the preferred chlorofluorocarbons of the Green reference was $CFCl_3$, (which was no longer available for me to test), I believe, based on information available in this field, that the fire extinguishing performance of $CHClF_2$ would be substantially equivalent to the performance of $CFCl_3$ and the ozone depletion potential of $CHClF_2$ would be one-twentieth (1/20) that of $CFCl_3$.

7. All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true. All statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the above-identified application or any patent issuing thereon.

Date: 3 March 1992

Richard Edward Fernandez

Richard Edward Fernandez